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TITLE : STEEL FOR MACHINE STRUCTURAL USE, EXCELLENT IN MACHINABILITY AND QUENCHING CRACK RESISTANCE, AND ITS PRODUCTION

ABSTRACT : PROBLEM TO BE SOLVED: To obtain a steel for machine structure use, having high torsional strength after induction hardening and tempering and excellent in machinability and quenching crack resistance, by specifying a chemical composition and the structure of a core part, respectively.

SOLUTION: This steel for machine structural use has a composition consisting of, by mass, 0.35-0.60% C, $\leq 0.05\%$ Si, 0.65-1.70% Mn, $\leq 0.020\%$ P, 0.005-0.035% S, $\leq 0.15\%$ Cr, 0.05-0.50% Mo, 0.01-0.05% Ti, 0.01-0.05% Al, $\leq 0.01\%$ N, 0.0005-0.0050% B, and the balance Fe and also has a structure containing bainitic phase by 5-30% by area ratio, and further, the above torsional strength is regulated to $\geq 1400\text{MPa}$ in this steel. The quenching crack resistance of this steel can be improved to a greater extent by regulating the Ms value, defined by equation, $M_s = 538 - 317(\%C) - 33(\%Mn) - 28(\%Cr) - 17(\%Ni) - 11(\%Si) - 11(\%Mo)$, to ≥ 360 . Moreover, one or more kinds among $\leq 1.0\%$ Cu, $\leq 3.5\%$ Ni, 0.01-0.30% V, and 0.005-0.050% Nb can be further incorporated into the steel.

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